

## Study guide of your final exam

The exam will cover the materials after mid-term exam. What you need to study:

- (1) lecture notes (after mid-term exam)
- (2) quiz (Quiz #5-12)
- (3) reading assignments (the main point of the articles).

When I developed the curriculum of this course, most lecture materials are chosen from several books and many articles. Most of my lecture notes can not be found in your textbook. Please email me or call me (lab: 212-3278381; cell: 917-4141533) if you don't understand the lecture notes.

The exam will have (1) multiple choice; (2) short answer; (3) true or false; (4) short essay.

To make the exam much easier for you, **70%** of the questions will come from the quizzes. However, the final-exam questions will come with a different format (for example, I will change a question from multiple choices in the quiz to short answer in final exam). If you study the quizzes well, you should be able to pass the final exam. Make sure you understand the questions and the correct answers. It is a good idea to check the lecture notes so that you know what the entire topic is about.

To make the exam even easier for you, most of the questions will come from the topics that you are more interested in (based on the survey we did 2 weeks ago): proximate/ultimate causes; parental care; animal cognition; evolution of human behavior; animal intelligence, personality, and brain.

Also, make sure you understand the main points of several articles: (Food caching strategy in scrub jay; Personality gene; Foraging and pregnant brain; Animal intelligence and evolution of human mind).

The short essay will include some of the following points that I keep emphasizing in this class:

1. When you see an animal behavior, ask yourself two questions: the proximate and ultimate questions, and come up with testable hypotheses.
2. When asking a proximate or ultimate question or hypothesis, try to come up with an experiment to test the hypothesis.
3. To better understand animal's mind and intelligence (or cognition), you need to understand the animal's natural history. The blue tit has the intelligence to open the milk bottle because, perhaps, a similar skill (e.g., open the tree trunk) has been regularly used by the tit in its daily routine behavior in nature.
4. Different animal species have different intelligence, some animals can detect magnetic field, some can produce or detect ultrasounds; bowerbirds can build extraordinary courtship arena to court females; and social insects are

- highly altruistic. We humans are smarter than other animals in some ways, but not in others.
5. Innate and learning behavior: you might realize even the most complex learned behaviors are, to a certain degree, under the control of innately genetic program. On the other hand, simple innate behaviors often times can be modified by experience.
  6. Genes and behavior: how do genes control behavior? How do genes interact with environment to control behavior? (see 7-9)
  7. Parental care: Parental care has a big impact on the mental development (stress response) of young, and importantly, this behavior can be passed to the next generation without genetic mechanism (through epigenetic program: environmental agents change the on or off of gene expression). Abusive mother rats are more likely to abuse baby rats → baby rats grow up → become abusive mother → .....
  8. Personality (Like father, like son): A lot of our behaviors are partially controlled by genes, including personality. There are many genes that are associated with our personality. However, a shy person can still be changed to a leader with constant reinforcement and effort, or changing social environment (or vice versa).
  9. Evolution of human culture and behavior: According to evolutionary biologists, we can identify the evolutionary roots (shaped by natural selection) in human behaviors, including highly diverse human culture. Examples like mate choice, adoption, blood donation etc.

Finally, no matter what profession you choose in the future, stay open-minded to observe and appreciate nature and help us to preserve the diversity of animals.